POLITECNICO DI TORINO
Repository ISTITUZIONALE

FROM THE GRID TO THE LAYER: POST-INDUSTRIAL CITY AS CITY IN (MORPHOLOGICAL) TRANSITION

Original
FROM THE GRID TO THE LAYER: POST-INDUSTRIAL CITY AS CITY IN (MORPHOLOGICAL) TRANSITION / Barosio, Michela. - ELETTRONICO. - 1:(2021), pp. 136-146. (EAAE-ARCC International conference - The architect and the city Valencia, Spagna 11-14 novembre 2020).

Availability:
This version is available at: 11583/2872714 since: 2021-02-28T17:00:14Z

Publisher:
Editorial Universitat Politècnica de València

Published
DOI:

Terms of use:

This article is made available under terms and conditions as specified in the corresponding bibliographic description in the repository

Publisher copyright

(Article begins on next page)

08 January 2026

EAAE-ARCC INTERNATIONAL CONFERENCE

2nd VALENCIA INTERNATIONAL BIENNIAL OF RESEARCH IN ARCHITECTURE

11-14 NOV 2020

THE ARCHITECT AND THE CITY

VOLUME 1

UNIVERSITAT POLITÈCNICA DE VALÈNCIA

ESCOLA TÈCNICA SUPERIOR D'ARQUITECTURA

Publisher:

Editorial Universitat Politècnica de València, 2020
http://www.lalibreria.upv.es
ISBN 978-84-9048-842-3 (Set of two volumes)
978-84-9048-981-9 (Volume 1)
978-84-9048-982-6 (Volume 2)

All rights reserved:

© of the images, their authors
© of the drawings, their authors
© of the texts, their authors
© of this edition

Editorial Committee:

Ivan Cabrera i Fausto
Ernesto Fenollosa Forner
Ángeles Mas Tomás
José Manuel Barrera Puigdollers
Lluís Bosch Roig
José Luis Higón Calvet
Alicia Llorca Ponce
María Teresa Palomares Figueres
Ana Portalés Mañanós
Juan María Songel González

Coordination and design:

Júlia Martínez Villaronga
Mariví Monfort Marí
Maria Piqueras Blasco
Diego Sanz Almela

EAAE-ARCC International Conference & 2nd VIBRArch: The architect and the city. / Editorial Universitat Politècnica de València

Se permite la reutilización de los contenidos mediante la copia, distribución, exhibición y representación de la obra, así como la generación de obras derivadas siempre que se reconozca la autoría y se cite con la información bibliográfica completa. No se permite el uso comercial y las obras derivadas deberán distribuirse con la misma licencia que regula la obra original.

Conference Chair:

Ivan Cabrera i Fausto

Steering Committee:

Oya Atalay Franck
Hazem Rashed-Ali
Ilaria Valente
Ivan Cabrera i Fausto

Organizing Committee:

Ernesto Fenollosa Forner
Ángeles Mas Tomás
José Manuel Barrera Puigdollers
Lluís Bosch Roig
José Luis Higón Calvet
Alicia Llorca Ponce
Maite Palomares Figueres
Ana Portalés Mañanós
Juan María Songel González
Mª Mercedes Cerdá Mengod

Design and Logistics:

Mariví Monfort Marí
Marcos Lizondo Chardí
Maria Piqueras Blasco

Scientific Committee:

Doreen Adengo
Adengo Architecture, Kampala

Fernando Agrasar Quiroga
Universidade da Coruña

Naime Esra Akin
Beykent University

Ajla Aksamija
University of Massachusetts Amherst

Ahmed K. Ali
Texas A&M University

Ana Almerich Chuliá
Universitat Politècnica de València

Miguel Alonso del Val
Universidad de Navarra

Adolfo Alonso Durá
Universitat Politècnica de València

Eva Álvarez Isidro
Universitat Politècnica de València

Cecilie Andersson
Bergen School of Architecture

Isabelle Anguelovski
Universitat Autònoma de Barcelona

Craig K. Anz
Southern Illinois University

César Aquino Insfrán
Universidad Autónoma de Encarnación

Eugenio Arbizzani
Sapienza Università di Roma

Maziar Asefi
Ryerson University

Izaskun Aseguinolaza Braga
Euskal Herriko Unibertsitatea

Oya Atalay Franck
Zurich University of Applied Sciences and Arts

Pnina Avidar
Fontys Hogescholen Tilburg

Rahman Azari
Illinois Institute of Technology

Marilda Azulay Tapiero
Universitat Politècnica de València

Ángela Baldellou Plaza
Observatorio del CSCAE

Berta Bardí i Milà
Universitat Politècnica de Catalunya

César Bargues Ballester
The Getty Conservation Institute

Michela Barosio
Politecnico di Torino

José Manuel Barrera Puigdollers
Universitat Politècnica de València

Luisa Basset Salom
Universitat Politècnica de València

Genevieve Baudoin
Kansas State University

Liliana O. Beltrán
Texas A&M University

Julio Bermúdez
The Catholic University of America

Henriette Bier
Technische Universiteit Delft

Manuel Blanco Lage
Universidad Politécnica de Madrid

María del Carmen Blasco Sánchez
Universitat Politècnica de València

Ana Bonet Miró
The University of Edinburgh

Victoria E. Bonet Solves
Universitat Politècnica de València

Mary Ben Bonham
Miami University

Lluís Bosch Roig
Universitat Politècnica de València

Dag Boutsen
KU Leuven

Anne Mette Boye
Arkitektskolen Aarhus

Ewan Branda
Woodbury University

Danelle Briscoe
The University of Texas at Austin

Óscar Brito González
University of the Arts London

Sigita Bugenienė
Kaunas City Municipal Administration

Ivan Cabrera i Fausto
Universitat Politècnica de València

Romina Canna
IE University

Roberto Vicente Cañete Ferreira
Universidad Autónoma de Encarnación

Miguel Ángel Carrión Carmona
Universitat Politècnica de València

María Emilia Casar Furió
Universitat Politècnica de València

Pepa Cassinello
Universidad Politécnica de Madrid

Nuria Castilla Cabanes
Universitat Politècnica de València

Roberto Cavallo
Technische Universiteit Delft

M. Rosa Cervera Sardá
Universidad de Alcalá

Pilar Chías Navarro
Universidad de Alcalá

Carola Clemente
Sapienza Università di Roma

Helena Coch Roura
Universitat Politècnica de Catalunya

Beatriz Colomina
Princeton University

Edoarda Corradi Dell'Acqua
Illinois Institute of Technology

Manuel Couceiro da Costa
Universidade de Lisboa

Catherine Croft
Twentieth Century Society

Nur Çaglar
TOBB University of Economics and Technology at Ankara

Ana-Maria Dabija
Universitatea de Arhitectura si Urbanism "Ion Mincu"

Pau de Solà-Morales Serra
Universitat Rovira i Virgili

Johan de Walsche
Universiteit Antwerpen

Lynne Marie Dearborn
University of Illinois at Urbana-Champaign

Adalberto Del Bo
Politecnico di Milano

Matt Demers
Barker/Nestor Architects

Miguel Ángel Díaz Camacho
Universidad Camilo José Cela

Carmen Díez Medina
Universidad de Zaragoza

Victoria Domínguez Ruiz
Universidad de Sevilla

Neslihan Dostoğlu
İstanbul Kültür University

Laurent Duport
Ecole Nationale Supérieure d'Architecture de Montpellier

Ihab Elzeyadi
University of Oregon

Inmaculada Esteban Maluenda
Universidad Complutense de Madrid

Maria Faraone
Oxford Brookes University

Emilio Faroldi
Politecnico di Milano

Ernesto Fenollosa Forner
Universitat Politècnica de València

Laura Fernández Durán
Universidad CEU Cardenal Herrera

J. Kent Fitzsimons
Ecole Nationale Supérieure d'Architecture et de Paysage de Bordeaux

Teresa Fonseca
Universidade do Porto

Giovanna Franco
Università degli studi di Genova

Jordi Franquesa Sánchez
Universitat Politècnica de Catalunya

Mercedes Galiana Agulló
Universidad Católica de Murcia

Inés García Clariana
Universidad Europea de Valencia

Ángela García Codoñer
Universitat Politècnica de València

Ángela García de Paredes
Universidad Politécnica de Madrid

Daniel García-Escudero
Universitat Politècnica de Catalunya

Carolina B. García-Estévez
Universitat Politècnica de Catalunya

Lidia García Soriano
Universitat Politècnica de València

Queralt Garriga Gimeno
Universitat Politècnica de Catalunya

Mariona Genís Vinyals
BAU, Centre Universitari de Disseny de Barcelona

Saul Golden
Ulster University

Carlos Gómez Alfonso
Universitat Politècnica de València

Enkarni Gómez Genua
Euskal Herriko Unibertsitatea

M. Esther Gómez-Martín
Universitat Politècnica de València

Walter Grondzik
Ball State University

Arianna Guardiola Víllora
Universitat Politècnica de València

Ignacio Guillén Guillamón
Universitat Politècnica de València

Elsa Gutiérrez Labory
Universidad de Las Palmas de Gran Canaria

Mary Guzowski
University of Minnesota

Bruce Haglund
University of Idaho

J. Brooke Harrington
Temple University

Harriet Harriss
Pratt Institute

Richard Lee Hayes
Central Michigan University

Deirdre L.C. Hennebury
University of Michigan

José Luis Higón Calvet
Universitat Politècnica de València

Dalibor Hlaváček
Czech Technical University in Prague

Roberta Ingaramo
Politecnico di Torino

Susana Iñarra Abad
Universitat Politècnica de València

Edurne Izagirre Elizaran
Universidad Autónoma de Encarnación

Eva Jiménez Gómez
Universitat Politècnica de Catalunya

Carmen Jordá Such
Universitat Politècnica de València

Ignacio Juan Ferruses
Universidad CEU Cardenal Herrera

Francisco Juan Vidal
Universitat Politècnica de València

Susanne Komossa
Technische Universiteit Delft

Robert J. Krawczyk
Illinois Institute of Technology

Pablo La Roche
California Polytechnic State University Pomona

Vincenzina La Spina
Universidad Politécnica de Cartagena

Carlos Lameiro
Universidade de Lisboa

Susana Landrove
Fundación DOCOMOMO Ibérico

Riva Lava
National Technical University Athens

Laura Lizondo Sevilla
Universitat Politècnica de València

Blanca Lleó Fernández
Universidad Politécnica de Madrid

Jaime Llinares Millán
Universitat Politècnica de València

Maria Carmen Llinares Millán
Universitat Politècnica de València

Verónica Llopis Pulido
Universitat Politècnica de València

Alicia Llorca Ponce
Universitat Politècnica de València

Angela Lombardi
The University of Texas at San Antonio

Emma López Bahut
Universidade da Coruña

Concha López González
Universitat Politècnica de València

Mar Loren Méndez
Universidad de Sevilla

Antonio Maciá Mateu
Universitat d'Alacant

Khaled Mansy
Oklahoma State University

Polyxeni Mantzou
Democritus University of Thrace

Frederick Marks
Salk Institute for Biological Studies

Kat Martindale
Architecture + Urbanism Research Office

Arturo Martínez Boquera
Universitat Politècnica de València

Raquel Martínez Gutiérrez
Universidad Rey Juan Carlos

Antonio Martinez-Molina
University of Texas at San Antonio

Roser Martínez Ramos e Iruela
Universidad de Granada

Ángeles Mas Tomás
Universitat Politècnica de València

Marta Masdéu Bernat
Universitat de Girona

Nuria Matarredona Desantes
Conselleria d'Habitatge i Arquitectura Bioclimàtica

Thomas McQuillan
Arkitektur- og designhøgskolen i Oslo

Laura Liliana Medina Valenzuela
Universidad Autónoma de Encarnación

Clara Mejía Vallejo
Universitat Politècnica de València

Camilla Mileto
Universitat Politècnica de València

José Luis Miralles i García
Universitat Politècnica de València

Valerian Miranda
Texas A&M University

Alex Mitxelena Etxeberria
Euskal Herriko Unibertsitatea

Eugenia Moliner
Roosevelt University

Javier Monclús Fraga
Universidad de Zaragoza

Francisco Javier Montero Fernández
Universidad de Sevilla

Jésica Moreno Puchalt
Universitat Politècnica de València

Sofia Morgado
Universidade de Lisboa

Michel Mounayar
Ball State University

Brook Muller
University of Oregon

Daniela Müller-Eie
Universitetet i Stavanger

Stefano Musso
Università degli studi di Genova

Zaida Muxi
Universitat Politècnica de Catalunya

Marc Neveu
Arizona State University

Rashida Ng
Temple University

Lucyna Nyka
Gdańsk University of Technology

Derya Oktay
Ondokuz Mayıs University

Leticia Ortega Madrigal
Institut Valencià de l'Edificació

Dolores Otero Chans
Universidade da Coruña

María Teresa Palomares Figueres
Universitat Politècnica de València

Cristina Pardo García
Universitat de València

Ulrike Passe
Iowa State University

Luz Paz Agras
Universidade da Coruña

José Manuel Pelegrín Santacruz
Universidad Central del Ecuador

Víctor Pérez Escolano
Universidad de Sevilla

Javier Pérez Igualada
Universitat Politècnica de València

Marta Pérez Rodríguez
Universitat Politècnica de València

Alfred Peris Manguillot
Universitat Politècnica de València

Troy Peters
Wentworth Institute of Technology

Marios C. Phocas
University of Cyprus

Àngel Pitarch Roig
Universitat Jaume I

Philip Plowright
Lawrence Technological University

Ute Poerschke
The Pennsylvania State University

Çiğdem Polatoğlu
Yıldız Teknik Üniversitesi

Ana Portalés Mañanós
Universitat Politècnica de València

Javier Poyatos Sebastián
Universitat Politècnica de València

Sonia Puente Landazuri
Comunica:Ciudad

Núria Ramon Marqués
Universitat de Lleida

Ana Ramos Sanz
Fundació Mies van der Rohe

Hazem Rashed-Ali
The University of Texas at San Antonio

Traci Rose Rider
North Carolina State University

Fatih A. Rifki
Montana State University

Michelle Rinehart
Georgia Institute of Technology

Carmen Ripollés
Portland State University

Clare Robinson
The University of Arizona

Julia W Robinson
University of Minnesota

David Rockwood
University of Hawaii at Manoa

Krešimir Rogina
University American College Skopje

Pilar Roig Picazo
Universitat Politècnica de València

Marcos Ros Sempere
Universidad Politécnica de Cartagena

Mia Roth-Čerina
Sveučilište u Zagrebu

Alberto Rubio Garrido
Institut Valencià de l'Edificació

Felipe Samarán Saló
Universidad Francisco de Vitoria

João Rafael Santos
Universidade de Lisboa

Marja Sarvimaki
Bond University

Paola Sassi
Oxford Brookes University

Meredith Sattler
California Polytechnic State University

Thomas Schroepfer
Singapore University of Technology and Design

Veronika Schröpfer
Architects' Council of Europe

Marina Sender Contell
Universitat Politècnica de València

Carla Sentieri Omarrementeria
Universitat Politècnica de València

Begoña Serrano Lanzarote
Universitat Politècnica de València

Adil Sharag-Eldin
Kent State University

Lamila Simisic Pasic
International University of Sarajevo

Madlen Simon
University of Maryland

Brian Robert Sinclair
University of Calgary

Félix Solaguren-Beascoa de Corral
Universitat Politècnica de Catalunya

Enrique Solana Suárez
Universidad de Las Palmas de Gran Canaria

Juan María Songel González
Universitat Politècnica de València

Cristina Soriano Cuesta
Universidad de Sevilla

Asenet Sosa Espinosa
Universitat Politècnica de València

Laura Soto Francés
Conselleria d'Habitatge i Arquitectura Bioclimàtica

Constantin Spiridonidis
Aristotle University of Thessaloniki

John C. Stallmeyer
University of Illinois at Urbana-Champaign

Alexandra Staub
The Pennsylvania State University

Sally Stewart
Mackintosh School of Architecture, Glasgow School of Art

Jae Yong Suk
The University of Texas at San Antonio

Judit Taberna Torres
Universitat Politècnica de Catalunya

Beatriz Tarazona Vento
Universidad Central del Ecuador

Rafael Temes Córdovez
Universitat Politècnica de València

Aron Temkin
Norwich University

Ana Torres Barchino
Universitat Politècnica de València

Vasilia Trova
University of Thessaly

Macarena Trujillo Guillén
Universitat Politècnica de València

Marci Uihlein
University of Illinois at Urbana-Champaign

Judith Urbano
Universitat Internacional de Catalunya

Mónica Val Fiel
Universitat Politècnica de València

Ilaria Valente
Politecnico di Milano

Koenraad Van Cleempoel
Universiteit Hasselt

Sara Van Rompaey
E2ARC

José Antonio Vázquez Rodríguez
Universidade da Coruña

Fernando Vegas López-Manzanares
Universitat Politècnica de València

Anna Verges Parisi
Observatori Metropolità de l'Habitatge de Barcelona

Maria Pilar Vettori
Politecnico di Milano

Marisol Vidal
Graz University of Technology

Blanca Vila Cortell
Universidad Anáhuac Puebla

María José Viñals Blasco
Universitat Politècnica de València

Maria Voyatzaki
Aristotle University of Thessaloniki

Kate Wingert-Playdon
Temple University

João Pedro Xavier
Universidade do Porto

Dongwoo Jason Yeom
Lawrence Technological University

Shai Yeshayahu
Ryerson University

Shao Yong
Tongji University

Zdenek Zavrel
Czech Technical University

Tadeja Zupančič
Univerza v Ljubljani

INDEX

VOLUME 1

PAPER #1.09

FROM THE GRID TO THE LAYER: POST-INDUSTRIAL CITY AS CITY IN (MORPHOLOGICAL) TRANSITION

Michela Barosio[a]
[a]DAD Department of Architecture and Design, Politecnico di Torino, Torino, Italy

ABSTRACT

Starting from the assumption that industrial settlements have different roles in urban fabric, depending on their location, on their typology, on their size and their age of settlement, as well as on the pattern and the structure of the city considered, the paper will examine productive areas through six methodologies of urban analysis methods, ranging from urban morphology approach to perceptive approach. The different methods are employed to understand a different formal role of productive plants and they are applied to several cases studies from all over the world illustrating historical productive settlements already regenerated or still waiting for reconversion and a contemporary productive sites.
The paper will analyze the way in which urban analysis methods can engender different visions of the city, and specifically different approaches in the regeneration design of industrial dismantled areas to tackle the common misconception that post-industrial cities are places where no clear urban form is recognizable anymore, suffering of a lack of global urban vision, looking for new city's identity and vocation. Depending on the capability of recognizing their urban role, industrial dismantled areas, can be either considered as brown fields that prevent urban renewal or as strategical elements to regenerate the city, providing new opportunities.
The final goal is to set a methodology of morphological analysis able to grasp the transitional character of urban phenomenon, reading the post-industrial city as a stage of a continuous transition in urban form and not as a final step. In this perspective urban regeneration processes of urban industrial dismantled areas can be conceived as impermanent configurations originating from the historical traces and types but also anticipating future morphologies.

KEYWORDS

Urban morphology; transition; industrial settlements; layers.

INTRODUCTION

Starting from the assumption that industrial settlements have different roles in urban fabric, depending on their location, on their typology, on their size and their age of settlement, as well as on the pattern and the structure of the city considered, the paper will examine productive areas through six methodologies of urban analysis methods, ranging from urban morphology approach to perceptive approach. The different methods are employed to understand a different formal role of productive plants and they are applied to several cases studies from all over the world illustrating historical productive settlements already regenerated or still waiting for reconversion and a contemporary productive sites.
The paper will analyze the way in which urban analysis methods can engender different visions of the city, and specifically different approaches in the regeneration design of industrial dismantled areas to tackle the common misconception that post-industrial cities are places where no clear urban form is recognizable anymore, suffering of a lack of global urban vision, looking for new city's identity and vocation. Depending on the capability

of recognizing their urban role, industrial dismantled areas, can be either considered as brown fields that prevent urban renewal or as strategical elements to regenerate the city, providing new opportunities.
The final goal is to set a methodology of morphological analysis able to grasp the transitional character of urban phenomenon, reading the post-industrial city as a stage of a continuous transition in urban form and not as a final step. In this perspective urban regeneration processes of urban industrial dismantled areas can be conceived as impermanent configuration originating from the historical traces and types but also anticipating future morphologies.

1. POST-INDUSTRIAL CITIES ARE CITIES IN TRANSITION

1.1. From the industry to the city

The concept of city itself is strongly related to industrial revolution as the real change in population distribution and urban living patterns occurred with the industrial revolution in the nineteenth century. The development of industrial capitalism has shifted the balance between urban and rural. The proportion of people living in urban areas fluctuated between 4 per cent and 7 per cent throughout history, until about 1850 (Lowry, 1991). After the industrial revolution this proportion raised up to 30% in the Fifties of the XX century, but still growing even after the industrial crisis and during the deindustrialization process in Europe. Today more than 55% of population is living in urban context and UN estimate the urbanized population to raise 70% of the overall population by 2051[1].
This continuous and endless urban growth might be one of the reasons why during the industrial age we thought that the industrial endless growing paradigm, and the urban endless development related to it, was the only possible paradigm. In the same perspective the deindustrialization process has often been perceived as a phenomenon to counteract, wishing an industrial come back, driven by a new type of industry free from pollution and workers exploitation, to bring back wealth and incomes to our cities. This paper proposes a reverse perspective, considering, from the morphological point of view, the industrial age as a transitional age between pre-industrial settlement, proto-industrial city and post-industrial urbanization. In a more general way, in any age city's morphology ought to be considered a transitional configuration always hosting simultaneously morphological elements heritage from the previous era and other formal characteristics already anticipating the future stage.
Trying to focus on the post-industrial city we can assume that the morphological characteristics of industrial city related with the productive functions and the connected urbanizing phenomenon, such as transportation and mass workers housing, are quite evident while the formal consequences of the post industrial age are not that clear. This is also due to the fact that the concept of post-industrial cities should not be understood as a mere chronological or functional definition.

1.2. Post-industrial City. Possible definitions

A first possible acceptation of post-industrial city is a city which has been **characterized by a strong presence of industry** which has then left the specific urban environment to move away. In this sense it is important to understand how and when the industry has left the city. Following Marcel Smet deindustrialization taxonomy (Smet 1990), it is evident that the shape and the transformation potential of the urban settlement is directly linked to the kind of production settlement that was there before and also to the elapsed time from the industrial dismantling. In this sense we can observe several different cities from the industrialization

[1] United Nations World Urbanization Prospects 2018 https://population.un.org/wup/

phase till nowadays. Considering that in the European context the deindustrialization process starts from the beginning of the XX century in some regions, while in some others areas production sites still active till the end of the XX century, western cities become post-industrial cities in very different periods of the last century. For the same reasons, we might observe that the cities that have faced the deindustrialization process in the early years of the XX century, have then been dealing with a variety of urban phenomena leaving a multitude of physical traces characterizing a long transition from the industrial city, through the non-industrial city, toward a not-better defined contemporary city. According to this perspective the post-industrial city could be considered more a transitional phase of the city artifact, than a specific and final configuration.
In a second, broader, acceptation, a post-industrial city is any urban agglomeration developing in a socio-economic context in which industry, industrial production, are no longer the main driver for economic development and social behavior. In this frame most of the European cities are post-industrial cities and it is difficult to envision a common urban morphology, for their historical cores as well as for their new developments.
A third possible, but restrictive acceptation, to address the post - Fordist city is to consider it as a city where industrial production is still settled but with a different spatial and social organization from the Fordist age. This case is still rare in Europe, but more and more firms are looking to relocate their productive site in urban context in western countries. As W. F. Lever explains very well in his text The post Fordist city (Lever 2011), if in urban terms, Fordism could be equated with the success of large cities and large urban systems, it's because the predominant modes of production required locations in large cities, not just as the homes of large industrial workforces but as the providers of the most advantageous sets of externalities. Nowadays, the growth of the small enterprises sector, requires less labor employed, more flexibly, and the transition from employment in manufacturing to employment in services. In this sense Lever observes the 'uncongeniality' of the standardized towns, whose spaces differentiated according to function are no more suitable for the flourishing of small enterprises looking for the benefits of urban livability.

1.3. Urban industrialization as cycling process

Looking at these three possible definitions of post-industrial city, we realize that most of the European and western cities can correspond, in different proportions and in different parts of the urban territory, to all of them. In fact, despite the generalized de-industrialization process in Europe and north America, the urbanization process is still growing (Champion 2011). Transition from Urbanization to Suburbanization to Disurbanization, to Reurbanization (not forgetting Counterurbanization) is still going on, that's why we might assume that this is a cycle, not a linear process. Noticing that different countries and regions are at different stages of the de-industrialization process in a given period (Champion 2011), as well as different cities in the same region and different parts of the same cities are in different stage of the cycle, it becomes interesting to identify the different stages of this cycling phenomenon considering the different kind of city we are facing: are they inner cities, fringe belts, touristic cities, successful cities, shrinking cities? The only evident thing is that they all are *cities in transition*.
Speaking about cities in transition in literature, often means to speak about cities that are living transition phenomenon in their social, political or economic dimension. The urban built environment is often perceived as the final outcome of transition process which mainly concern other dimensions than the urban form itself. The Handbook of urban studies (Paddison 2011), identifies four types of cities coexisting dimensions at the same time in

the same Urbis: the city as environment, the city as people, the city as economy and the city as organized polity. Those "cities" have different but simultaneous evolutions that engender physical outcomes on the urban form. Therefore the second part of the paper proposes to use different analytical tools in order to catch the several layers of physical outcomes related to the various dimensions of the city. Industrial settlements are here used as index fossils to establish the relationship between the urban morphogenesis and possible urban regeneration design approaches.

In this frame it might be possible, aiming to set up new tools for urban morphological regeneration, to define post-industrial city through the identification and analysis of formal elements, or morphological characteristics, able to distinguish it from other types of cities.

As a matter of fact the morphogenesis of the industrial cities has been broadly discussed and should now be considered as a departure point to investigate the post-industrial city in his multiple variations in order to trigger and to design regeneration processes. Its main characteristics are well known ranging from their growing size, to the territorial spread phenomenon related to the new ways of transport, the zooning technique separating housing from production areas and from social housing through multiple enclosures. Arguably the most important single topic to which geographical urban morphologists have devoted their attention is the process whereby urban areas have grown physically (Whitehand 2011). But if the paradigm in which industrial city has flourished was an endless growth paradigm, the post-industrial city is dealing with a de-growth, or sustainable growth, paradigm in the frame of which we have to look for new generative models able to implement multiple social instances but also able to reconnect heterogeneous part of the city as heritage from the Fordist city.

2. URBAN ANALYSIS AND CITIES' MORPHOGENESIS: POSSIBLE LINK

Attempting to propose a first step towards a systematic understanding of generative models of the urban form, at a large scale, Raimbault and Perret, define urban form as "geometrical properties of building layouts at the scale of a district" and they underline the lack of quantitative indicators to measure urban form, which is mostly analyzed only in relation to visual impression. The proposal of Raimbault an Perret is to focus on the coevolution of building layout and road network through a set of indicators considered relevant at a district scale. Those indicators are set on a square grid that allows to compare different generative models able to capture both bottom-up-self organizing processes and top-down-planning processes. The grid can be adapted to the scale of the analysis as well as to the specific thematic focus on urban analysis. This kind of approach highlights how much urban analysis is a pair of glasses through which different phenomena and different characteristics of the urban fabric can be highlighted depending on the lens that we choose.

Urban industrial settlements are taken as case study to understand the possible link between the urban analysis method and the morphogenesis of the city for several reasons. First they often have driven, in the last two centuries, important city's expansion becoming the main catalysators for entire new neighborhoods structured by the industrial patterns and landmarks. As those cities have grown, the originally peripheric industrial suburbs have become central parts of the city and are nowadays strategic locations close to core city's center. Besides, those settlements are frequently characterized by bigger plots than the average of the urban fabric, allowing strategical urban transformation facilitated by the concentration of the real estate ownership. For all these reasons, urban industrial areas, even more when they are already dismantled areas, represent strategical factor for

morphogenesis or morpho-regeneration process of the city's fabric. The contemporary challenge is to understand the specific role that industrial settlement have played in the original morphogenesis of the city as well as the role they can play in contemporary regeneration of urban fabric.

The methodology proposed in this paper consists in defining six types of morphological relationships between industrial settlements and the city. Those six possible role performed by the industry in the urban context are infer from a broader observation of European main – former or present - industrial cities. For each type of relationship, a couple of urban analysis methods are suggested to foreground the specific formal role of the productive settlement analyzed. The hypothesis is that each method enables the understanding of peculiar interactions between the elements that generate urban form that are directly related to the morphogenesis of the city. The six types of interactions, the six different roles, mentioned depend on the type of industry, on the stage of urban development and on the preexisting morphological structure of the city. In this frame, productive sites can be considered as a new pattern in the city, a landmark on the urban landscape, a focus for new directions of development, a rift in the urban fabric, an urban scenery or a real city into the city itself.

2.1. Industrial settlements as pattern matrix

Some industrial settlements have been able to generate new patterns of the city, and therefore to trigger a brand new urban fabric based on the industrial building typologies, on the logistic principles and on the specific needs of the production. Because those settlements are characterized by building types and the streets and plot network, the best way to analyze their pattern is to merge the two traditional urban morphology analysis. The Muratori approach (Muratori 1960) operates a systematic building survey specifically focusing on the ground floors survey to highlight the relationship between private and public space. Building a sequence of historical buildings survey of the settlements, Muratori's analysis reveals the "hidden structure" of urban phenomena, the morphogenesis process. Applied to the Michelin Area (fig. 1) developed in the second part of the XIX century in the northern part of Torino (Italy), this type of analysis unveils the original connection between the contemporary urban fabric and the pattern enclosure inside the dismantled factories' wall. The other school related to morphological approach, the Conzenian approach (Conzen 1960), can usefully complete the Muratori' s analysis. Actually Conzen focus more on the arrangement of street and plots and therefore allows to understand how the industrial needs, in term of movement and circulation, engender the urban pattern of street and how the plot's characteristics of the industry is able to deal and/or to influence residential surrounding patterns. The regeneration of the industrial Docks on the riverside of Marseille well illustrates urban design centered on the reconversion of the industrial pattern driven by the conzenian approach.

Figure 1. Industrial settlements as a pattern matrix (author 2020)

2.2. Industrial settlements as new expansion directions' drivers

Other productive sites don't properly structure new patterns, but determine the directions for urban expansions. The modern city has then grow in a fragmented and discontinuous way along those axes as shown in the early XX century by the south development of the city of Torino toward the new settled FIAT Factory of Lingotto (fig. 2) or as it is happening by now in Maranello with the brand new Ferrari's Factory designed by Jean Nouvel in the outskirt of the city. Therefore to analyze these heterogeneous new parts of the city we attempt to disassembly complexity, trying to break up the urban fabric into elementary urban entities as suggested by Paola Viganò (Viganò 1999). This helps in understanding the new characters of the contemporary city where buildings are no more space definers, like in the traditional compact city, but have become space occupiers. In this frame the definition of the contemporary urban elements and their relationships enable to read the city as an overlapping of layers no more ordinated through a general plan but generating an urban fabric apparently chaotic, characterized by the intersections and the conflicts of the multiple layers. In this context a non-built element of the city turns to be essential to better understand the morphogenesis of the city: the study of the flows. Pioneered in the Seventies by Bill Hillier (Hillier 1982,) together with his colleagues at UCL, Space syntax analysis aims to analyze and represents the spatial accessibility in the city at different scales. This type of analysis makes the invisible visible describing how urban morphology can have deep impact flows' circulation and attempting to design new urban masterplan able to ensure, through the location, the position and the spatial layout of building elements, a more accessible, and therefore livable, cities' expansions. The reconversion of the La Villette productive site in the far suburbs of Paris by Bernard Tschumi is completely based on a layer's rationale which is able to organize the people fluxes, as it is now a scientific public park, but also to keep memory of the industrial past traces.

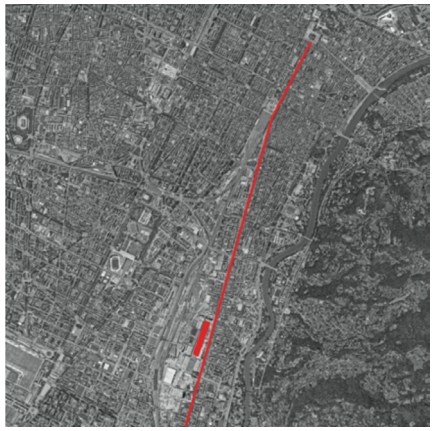

Figure 2. Industrial settlements as new expansion directions' drivers (author 2020)

2.3. Industrial settlements as a city in the city

In some cases, the industrial settlements are so big and so complex that they can be considered as "city in the city" in the sense that they are made by several buildings, a network of internal streets and open collective spaces, together with representative buildings, just like a real, traditional city. Very often those kind of settlements, raised from a small nucleus far from the city, has grown so much that when they came close to the city, or the city has grown up around the industrial settlements, they begun to need a precinct, a wall, to preserve the safety both of the citizen and of the workers. To understand the mutual relationships between the enclose pattern of the industrial site and the urban pattern of the neighborhood surrounding the industry precinct, the reading of basic

buildings types set up by the Muratori's follower, Gianfranco Caniggia seems to be a very useful tool (Caniggia 1979). The three steps of this urban analysis methods - to understand the historical reasons for urban form, to overcome them and to recognize the continuity in the morphogenesis of the city – enable to highlight the aggregation systems of buildings types and how urban tissues are generated through time in mutual relationships. The observation of the evolution phases of the urban structure shows as cities are made by continuous aggregation of unitarian, often originally homogeneous, nucleus or settlements. To investigate not only the topographical dimension of urban fabric, but to inquire also the aesthetical dimension of urban settlements, another Italian scholar, Cavallari Murat (Cavallari 1968) employ a conjectural survey to describe successive stages of the development of baroque cities in Italy detecting window's position, roofs' protrusions, entrances, porches and courtyards to describe the aesthetic evolution of the urban form. These elements specifically enhance how industrial buildings, for their types and for their formal elements, are, depending on the different phases of the urban evolution, part of the whole city, as in the case of the "White meat city" in Copenhagen (fig. 3) or a totally separate settlement, as in the case of the Matadero in Madrid. This character fundamentally impacts on the regeneration physical outcomes: if in the first case the district of White meat has been slowly and gradually reconverted by private investments into a restauration and shopping district completely embedded in the urban fabric of Copenhagen, in the second case the Matadero complex still enclosed in its protective walls and its regeneration and transformation in cultural district has been financed mainly by the municipali.

Figure 3. Industrial settlements as a city in the city (author 2020)

2.4. Industrial settlements as landmarks

For their scale, and for their iconic and symbolic values, part of the industrial settlements often represent urban landmarks and strongly contribute to the "image of the city" as Kevin Lynch described it in his masterpiece in 1960 (Lynch 1960). Therefore it is fundamental, to understand in depth their role in generating urban form, to use perceptive approach to analyze those settlements comprising built elements with strong visual impact at the city scale. Industrial architectonic elements such as chimneys, monumental façades, entrance gates or wall strongly contribute in building the urban image and to improve its "imageability". The industrial sites that have contribute, from the beginning of their development, to build this strong and vivid urban image, able to give identity, structure and meaning to the city, are nowadays not preserved as whole. Only elements recognized as landmarks are kept and protect by law, completely forgetting that their contribute to the urban image was not only made from those preserved exceptional buildings, but even from the relationships

that all the different parts of the site have built with the surrounding city. To catch these complex visual relationship the Gestalt theory is much helpful. Considering that "the whole is other than the sum of the parts", the Gestalt scholar identify several "laws" able to explain how the human mind subjectively perceive the relation between the different part of an organism. Arnheim applies these laws to architecture (Arnheim 1977) explaining how urban space is made from interplaying forces generated by built objects and how the perception of the space become dynamic arising from couples of antithetic values such as verticality/horizontality, empty and forlorn and so on. The perceptive approach seems to be antithetical to morphological approach because it counterpoises subjective approach to objective approach, tridimensional point of view to bi-dimensional vision, and non-expert vision to expert analysis. But aiming to understand morphogenesis' process of the city, in order to set un design guideline to regenerate urban industrial dismantled areas, the two approaches seem to complete each other adding a democratic dimension to the historical established tradition, explicating collective feeling to foster cultural identity, and being, both, pre-operational tools for the transformation of the city. This integrated approach is the key factor of the successful masterplan for the regeneration of the Van Nelle plant in Rotterdam (fig. 4) designed by Wessel de Jonge. In this project the new masterplan recognize the plant as an organic complex, a city in the city, and the buildings to be kept are decided according to their role as landmark for the industrial settlement and for the city. For the same, as the continuous glazed façade constitutes a real landmark for the urban landscape, the glass envelope it rebuild to look exactly as the original despite to the energetic issues: this important value is recognizable only through a perceptive analysis.

Figure 4. Industrial settlements as landmarks (author 2020)

2.5. Industrial settlements as a scenery

A different case is when the industrial sites become, for their dimension and for their location, a sort of scenery, a background for entire neighborhoods or land pieces. The idea that a building, or a group of buildings, can constitute an urban scene in the frame of which other urban elements are located and perceived is not new. From the History of architecture of Auguste Choisy (Choisy 1877) to The art of building Cities (Sitte 1902) many scholars have lighted the role of perception in the urban design, but it is only with the *Handbook to design urban landscape* of Gordon Cullen (Cullen 1961), that the role of the movement is explicated. Analyzing the urban scene through the Serial visions tool, Cullen explains that when wandering through the city we perceive two different elements: the existing view and the emerging view. As human mind reacts to contrasts, the contrast between these two views generates the image of the city as a coherent drama that, in this perspective, can be designed. Being the starting point of several urban expansions from the end of the XVIIIth century on, industrial settlements often become a scenery for the successive developments growing all around them. In

this sense workers housing, public services and infrastructures but also new activities connected with the new suburb, organize their location and their pattern considering the industry as a given background dominating the urban landscape. This phenomenon is well illustrate by one of the more representative buildings of FIAT, the renown Italian car factory, the Mirafiori plant (fig. 5). The first building dates back to the thirties, when I was located in the countryside, but the site kept growing till the eighties. Around the industrial plant housing, commerce and a big planted boulevard axed on the offices' building were built using the productive complex as a foreground, as a monumental scenery.

Figure 5. Industrial settlements as scenery (author 2020)

2.6. Industrial settlements as a rift

The multiplicity of roles that Industrial settlements can assume in the city analyzed in the previous paragraphs are all based on a specific type of interrelation between the productive site and the urban organism. The last role that we can observe is when no relationship is established between the city and the industry because the industry constitutes a sort of rift, of scarf in the urban fabric. Considering the land, and the city as well, as a palimpsest, André Corboz (Corboz 2001) suggests to read them as layered structured where traces from the past have been erased but still recognizable here and there by emerging fragments. To recognize the meaning of those emerging elements they have to be read as a part of a same layer. The palimpsest metaphor allows to consider the urban fabric as a parchment sheet full of inscriptions and traces left behind by society and construction not always taken into consideration when a new layer, like the productive layer, is added to the city. Therefore, following specific functional and logistical needs, sometimes industries are built up without any consideration to the previous rural or urban traces. The result is that the layout of the built elements as well as their pattern and their boundaries cut the city without any consideration for the existing urban pattern or connections. This is the case of the Ebbinge industrial suburb of Groningen in the Netherlands (fig. 6), where the industrial development of the early XX century consists in a series of productive pavilions built regardless to the previous urban pattern or to the surrounding plots. The regeneration operation called open Lab Ebbinge, assumed the rationale of the industrial original settlements, and promote a temporary settlement made of contemporary pavilions deliberately in contrast with the surrounding urban fabric, belonging to the pavilion layer of the historical factories.

Figure 6. Industrial settlements as rift (author 2020)

3. CITIES' MORPHOGENESIS: TRANSITION AND HYBRIDIZATION

Attempting to set a methodology of morphological analysis able to grasp the transitional character of urban phenomenon, reading the post-industrial city as a stage of a continuous transition in urban form and not as a final step, this paper describes a possible classification of the role played by industrial settlements in the city. It essential to remark that this taxonomy does not aim to establish fixed urban types or unambiguous relationships between industrial settlements and urban context. This sort of Atlas of industrial settlements' roles is set up through the induction method, from the observation of a multiplicity of case studies, general types are defined. The final goal of this methodology is to analyze urban dismantled areas in order to improve the outcomes of their regeneration process and of the redesign of consist parts of the city. As the taxonomy is based on the observation of multiple cases studies, it can be considered as an abduction operation. The abduction process proceeds from a single case study, or an innovative proposal, to formulate a new hypothesis, which is not yet a law or a rule, but just a possible principle to be further investigated, validated or fine-tuned. In this sense the industrial settlements can be firstly considered as playing one of the six roles identified and therefore analyzed through the urban analysis methods associated to each urban role. This first analysis is likely to highlight the non-matching elements, suggesting that all urban context are complex system non reducible to a single type of relationship between productive sites and city's pattern. Therefore the methodology forecasts to apply successively more than one urban analysis method to reflect the complexity of the urban palimpsest. Following the more commonly accepted conception of complex system as a system which is linked to the unpredictability of its evolution in time, the contemporary complex city is evolving in a vertical way, by transition in time, and in an horizontal way, by hybridization in space. To look at the city assuming those two actions, transition and hybridization, as the two main morphogenetic processes, might be effective in overcoming the fixity of urban types and in unveiling the relationships between urban elements often considered as inconsistent or corrupted while there just evidences of a city in transition.

Assuming the industrial age as a transition phase means to conceive the urban regeneration techniques not aimed to design a definitive urban design configuration, but rather to outline a flexible grid able to give consistency and meaning to the next steps of urban development. Urban regeneration projects should then plan the different urban functions as temporary and organized by layers, conceived as overlappable with a certain autonomy towards the grid that ensure their assemblage with an internal consistency. The final goal of the whole urban regeneration process, from a morphological point of view, is to improve the sense of urbanity. But what is "urbanity"? Irrespective to ages and geographical context, the essence of the city deals with mixité instead of zoning, with walkability, flexibility of spaces and infrastructures, with gathering spaces. The combined approach proposed, mixing urban analysis methods and bridging urban analysis with design, envisions urban regeneration as the process of repairing the urban grid, reconnecting the existing fragments, not searching for urban growth, but adding temporary, consistent and meaningful layers to this grid.

REFERENCES

Arnheim, R. 1977. *The dynamic of architectural Form*. Berkeley: University of California Press.

Batty, M. 2013. *The new science of Cities*. Cambridge: MIT Press.

Bertuglia, C.S., Vaio, F. 2019. *Il fenomeno urbano e la complessità*. Torino: Bollati Boringhieri.

Caniggia, G. 1979. *Lettura dell'edilizia di base*. Venezia: Marsilio.

Cavallari Murat, A. 1968. *Forma urbana e architettura nella Torino barocca. Dalle premesse classiche alle conclusioni neoclassiche*. Torino: UTET.

Champion, T. 2011. *Urbanization, Suburbanization, Counterurbanization and Reurbanization*. In Paddison, R. (ed) 2011. Handbook of urban studies. London: Sage publication.

Choisy, A. 1899, *Histoire de l'architecture*. Paris.

Conzen, M.R.G. 1970. *Alnwick, Northumberland: A Study in Town Plan Analysis*. London: Institute of British Geographers.

Corboz, A. 2001. *Le territoire comme palimpseste et autres essais*. Paris: Les éditions de l'Imprimeur.

Cullen, G. 1962. *Townscape*. London: Architectural Press.

Hillier, B. 1999. *Space is the machine: a configurational theory of Architecture*. Cambridge: Cambridge University Press.

Lever, W. F. 2011. *The Post-Fordist City*. In Paddison, R. (ed) 2011. Handbook of urban studies. London: Sage publication.

Lynch, K. 1960. *The image of the city*. Cambridge: MIT Press

Muratori, S. 1960. *Studi per una operante storia urbana di Venezia*. Roma: Istituto Poligrafico dello Stato.

Olmo, C. 1980. *La città industriale. Protagonisti e scenari*. Torino: Einaudi.

Paddison, R. (ed) 2011. *Handbook of urban studies*. London: Sage publication.

Raimbault, J., Perret, J. 2019. G*enerating urban morphologies at large scale*. ALIFE 2019: Proceedings of the Artificial Life Conference 2019. Cambridge: MIT Press.

Sitte, C. 1889. *Der Städtebau nach seinen künstlerischen Grundsätzen*. Wien.

Smet, M. 1990. A *Taxonomy of Deindustrialization* in 42 Rassegna – The abandoned Areas. Milan: CIPIA

Tang, M., Yang, D. 2008. *Urban paleontology, evolution of urban forms*. Irvine: Universal Publishers.

Viganò, P. 1999. *La città elementare*. Milano: Skira.

Whitehand, J.W.R. 2011, *The Physical Form of Cities: A Historico-Geographical Approach*. In Paddison, R. (ed) 2011. *Handbook of urban studies*. London: Sage publication.

European Association for Architectural Education
Association Européenne pour l'Enseignement de l'Architecture

ARCC
ARCHITECTURAL RESEARCH CENTERS CONSORTIUM

GENERALITAT VALENCIANA
Conselleria d'Innovació, Universitats, Ciència i Societat Digital

GENERALITAT VALENCIANA
Vicepresidència Segona i Conselleria d'Habitatge i Arquitectura Bioclimàtica

IVE
INSTITUT VALENCIÀ de l'EDIFICACIÓ

Livingceramics

CÀTEDRA LIVING ARCHITECTURE

càtedra hab

CÁTEDRA BLANCA
VALENCIA

UNIVERSITAT POLITÈCNICA DE VALÈNCIA

ESCOLA TÈCNICA SUPERIOR D'ARQUITECTURA

Editorial
Universitat Politècnica de València